JUL 9 1968
MONTANA FISH & GAME

VOLUME III NO. 6 MONTANA FISH AND GAME DEPARTMENT JUNE, 1968

Tragedy and Truth of SNAKE BITE Treatment

By Dr. Donald E. Espelin M.D.

Editorial Assistance by Vernon Craig

Doctor Espelin is a practicing pediatrician and director of the Poison Control Center in Helena, Montana. He received his medical training at the University of Utah and was associated for a number of years with Dr. Alan K. Done, Professor of Pediatrics at the University of Utah and head of the Poison Control Center in Salt Lake City, Utah.

Appreciation is extended to Doctor Done for his review of and suggestions to this article.

Probably no other group has been as imaginative in devising treatment for rattlesnake bite as were writers of western fiction. With polka-dotted bandanna knotted tightly about an arm, the alkali-dusted, pulp paper hero would sterilize a knife in the open flame of a sagebrush fire. Unflinchingly, wounds were cut in the arm about the bite and the poison "drawn out." Then came the finale-the part with imagination. Wounds were quenched with white-hot branding irons, seared with powder from .44 cartridges, packed in the healing mud of mineral springs, or swathed in magical herbs known only to the Indian witch doctors. Whiskey, the universal pain killer, was taken liberally before, during, and after the ceremonies, and sometimes splashed on for good measure. To the best of my knowledge, a western magazine hero was never lost to snakebite.

Whatever treatment early westerners may have actually used for snakebite, their mistakes are certainly excusable. Little was known about the chemistry of snake venom and there was little research or record to establish any precedent for uniform treatment. Historically, the treatment of snakebite has been surrounded by witchery and mysticism. It was not until the late 1600's that an Italian, Redi, demonstrated that venom, not enraged spirits, oozed from the fangs of vipers. Even today there is much to be learned about the highly complex nature of snake venom. There has been, however, enough good research and enough clinical information gathered to establish a uniform treatment for snake bite. There is no longer any excuse for ill-advised treatment, some of which may do more harm than good.

With but one exception, the poisonous snakes native to the United States are pit vipers. The name applies to a small "pit" below each eye of these snakes. The pits lead to what are apparently heat sensitive organs instrumental in directing a snake's strike. Pit vipers include rattlesnakes and mocassins of which the copperhead is a member. One kind or more of pit viper is known to inhabit all of the contiguous 48 states except Maine. Our other poisonous snake is the coral snake which in-

Thermal pit of rattlesnake is located forward and below the eye. X in the picture locates one of the fang sheaths into which the fangs are normally folded. Both thermal pit and fang sheaths are absent in the bull snake. Round pupil of the bull snake can be seen, and elliptical slit-like pupil of the rattlesnake is barely discernable.

habits southern states from Florida to southern Arizona, New Mexico and Texas.

In Montana the only poisonous snake is the prairie rattler which bears the Latin name **Crotalus viridis viridis.** By most standards our prairie rattlers aren't large. They're no match in size or lethalness to the eastern diamondback, the Texas diamondback, or even the timber rattler which ranges much of the eastern United States.

Most Montana outdoorsmen know the spine-chilling whirr of the aroused rattler. The prospects of having those venomous hypodermic-like fangs driven into one's flesh is unnerving to contemplate. Fortunately, the incidence of snakebite is low. There's no ready source to indicate how many people have been bitten in Montana over a given period, but State Board of Health records show only one death from 1956 through 1965 attributed to snakebite. During the same period, there were three or four deaths in Montana resulting from insect stings.

Some authorities estimate that there are 2,000 to 3,000 venomous snake bite accidents each year over the United States, and only 10 or so deaths. The highest death rates are reported from Arizona, Florida, Georgia, Texas and Alabama respectively. Rattlesnakes account for 75 to 85 percent of all human deaths from snakebites and the bulk of these fatalities include persons under 15 and 50 or older. The eastern or Florida diamondback is North America's largest and most dangerous reptile, with the Texas diamondback running a close second. Both are considered among the world's most venomous snakes.

Rattlesnakes do most of their moving about at night. Given the chance they'll usually crawl away or "rattle" when alarmed. They will sometimes strike without apparent provocation and without warning. The strike is a lightning-quick stab. During a strike, the snake's mouth flies open wide and the fangs stick out like needles. Both fangs, or only one may puncture the flesh. Rarely does a snake eject all its venom in one strike. They may strike a second time, or even more and eject venom each time. Since snakes can effectively strike only about one-half their bodies' length, it's understandable that most bites are suffered on the arms and hands, legs and feet.

When someone is struck by a rattlesnake, there's no immediate way to determine just how serious the situation might be. There is usually immediate, burning pain, though sometimes pain may not be felt until hours after the bite. Severity of pain does not necessarily indicate severity of the poisoning. Accordingly, each bite must be considered as serious and potentially fatal. Seriousness of a bite depends upon many things, including how deep the fangs have penetrated, which part of the body is bitten, size of the person, and size and individual characteristics of the snake.

The fangs of most adult rattlers are long enough to drive through skin into underlying muscle. The amount and type of the victim's clothing, accuracy of the strike, and size of the snake determine how deep the bite may be. Bites on the head, neck or trunk are generally more dangerous than those on arms or legs because the venom is absorbed into the system faster. As a rule, the smaller the body of the person bitten, the more serious the case. In children especially, the need for treatment is urgent. Size of the striking snake will have a bearing too, for larger snakes are capable of carrying larger amounts of venom. Toxicity, or potency of venom, will vary from one snake to another, regardless of size.

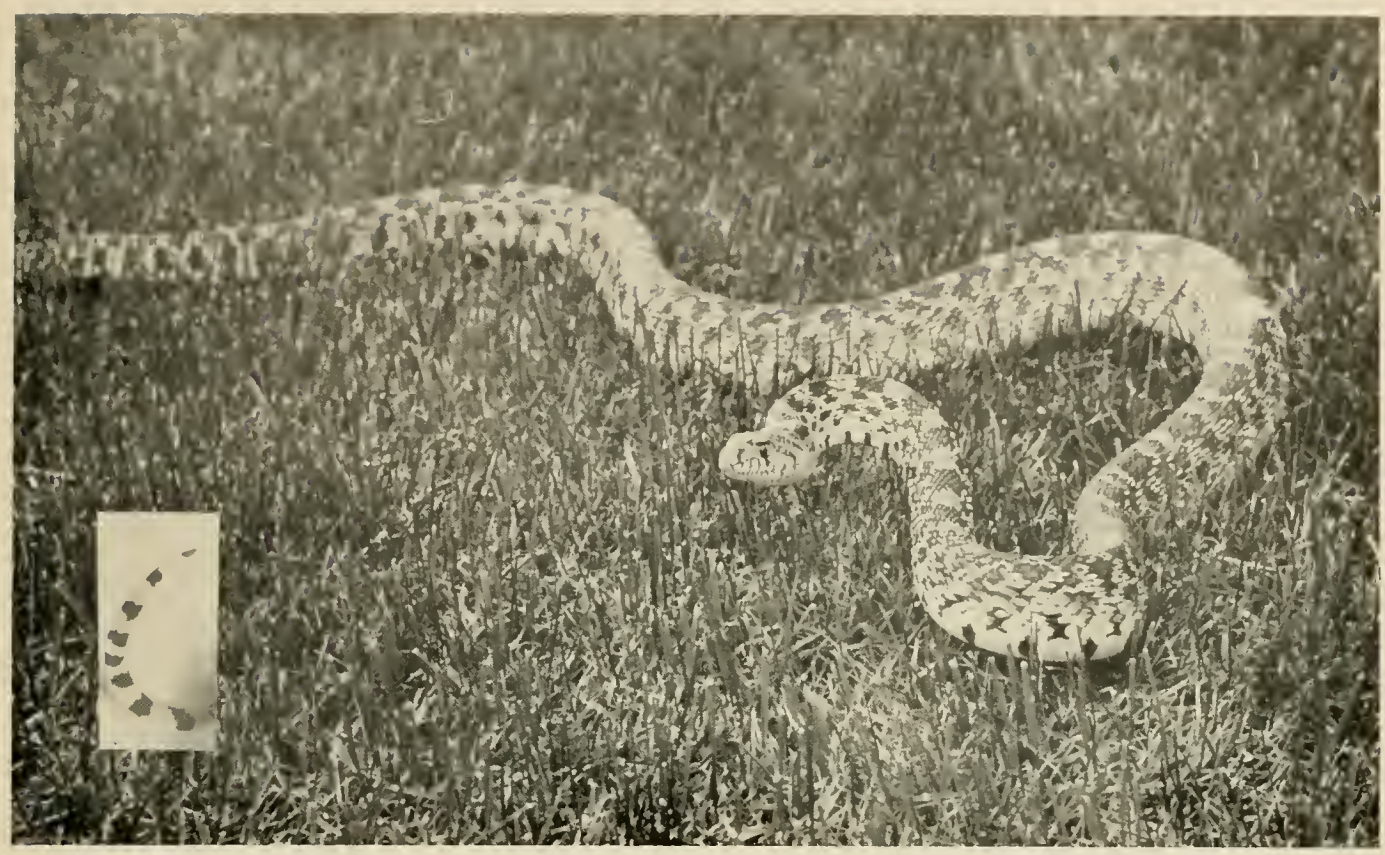
For clinical classification of snakebite as to severity, the following gradations have been determined:

MONTANA OUTDOORS

Published monthly by the Montana Fish and Game Dept., Mitchell Building, 125 Roberts Street, Helena, Montana 59601.

Second-class postage rates paid at Helena, Montana 59601

Edited by VERNON CRAIG



The harmless bull snake above is often mistaken for the praire rattler. Tail of the bullsnake is pointed (insert) and leads to quick identification if it can be seen. Tail of rattlesnake is, of course, terminated by the "rattles". Young rattlesnakes may have a single "button" on the tail.

The Wyeth antivenin kit "Antivenin Crotalidae Polyvalent" is effective against the venom of most North and South American poisonous snakes. The Kit contains a hypodermic syring, crystallized antivenin, water for mixing with antivenin, an iodine swab, and a dilute solution of serum to be used for determining sensitivity to horse serum.

Grade O.—presence of fang wound or wounds, but no signs of poisoning;

Grade 1.—fang wounds; throbbing or moderate pain localized at wounds; swelling extending not more than a few inches from the bite; after 12 hours no evidence of systemic involvement.

Grade 2.—in addition to the symptoms in grade 1, more severe pain and more severe and widespread swelling progressing toward the trunk (usually about halfway) in the first 12 hours; nausea, vomiting, dizziness; purple or crimson spots in the skin ,and dark discoloration under the skin in the area of swelling; usually a slight temperature which persists one to four days;

Grade 3.—may at first resemble grade 1 or 2; victim may be in shock within a few minutes after the accident; symptoms progress rapidly; swelling may involve bitten limb and part of trunk within 12 hours; discolored spots on the skin and discoloration under the skin may be general over the body; during the first 12 hours the pulse becomes rapid and weak; temperature below normal; patient approaches shock.

Other symptoms that may accompany snake bite are temporary blindness, cold sweating, paralysis, and convulsions, especially in children.

Until fairly recent years, the method of snakebite treatment was largely mechanical—it was all that was available. Some remedies were worse than no treatment at all. Even now, there is much misinformation and contradiction regarding snake bite treatment. Let's take a look at some mechanical methods of snakebite treatment in the light of our present knowledge. The old standbys were commonly tourniquets, incision and suction, and chilling with ice.

If a snake bites deeply enough to penetrate muscle then a tourniquet would have to be so tight as to cut off the blood flow in order to slow the spread of venom. When the blood supply is cut off to a part of the body, that part of the body dies. This is extremely important to remember. A tourniquet applied tightly enough to cut off the blood supply should be used only in the full knowledge that the limb may have to be sacrificed. Ill-advised use of tourniquets has resulted in the loss of untold numbers of limbs.

McCollough and Gennaro report in the June 1963 Journal of Florida Medical Association as follows:

Tourniquet. — A tourniquet lightly occlusive in the field during a 30 to 60 minute period of incision and suction has not been proved to be of value experimentally, but would seem to possess some advantages. In unusual situations where the immediate systemic effects of the bite appear to be catastrophic, a completely occlusive tourniquet may be elected with the knowledge that sacrificie of the extremity may be necessary for the preservation of life. If medical care is hours away and local signs and symptoms are of an advanced nature (Grade 3 or 4) therapy of this type, though radical, could prevent a fatality or more extensive extremity damage. The release of such a complete tourniquet prior to amputation may have fatal consequences because of the immediate release of the poison into the blood stream. Antivenin should be given intravenously prior to this maneuver.

Two experimenters, Ya and Perry, after extensive research determined that "Incision-suction is probably of some benefit in treatment of snake bite. However, the spreading of venom incident to manipulation and the possibility of damage to important structures probably outweighs the

value to be gained from first aid measures . . . " If the bite has gone deep enough to enter muscle, it's difficult to get venom out by suction. If the bite is within the skin, then immediate incision and suction will recover some poison before it spreads. Ya and Perry concluded that incision-suction treatment should be used only in circumstances when no other treatment is available or will be available for many hours. **They found that after 30 minutes, incision and suction was entirety useless.**

Snakebite treatment by chilling (cryotherapy) was at one time popularized and accepted even by professionals. However, it has since been well substantiated that this therapy can lead to more severe damage than if it were not used at all. Newton C. McCollough, M.D. of Orlando, Florida sums up the treatment thusly: "The mere continuous icing of a hand of 12 to 24 hours could, in itself alone, without the presence of snake bite, result in loss of fingers, if not the entire member. The deceptive feeling of well-being and lack of swelling of a snakebitten extremity which follow the initial pain of ice packing are rapidly and dramatically reversed when the warming-up period occurs. The spread ot venom throughout the immersed portion has not been slowed one iota, even though temporarily, its destructiveness is delayed . . . "

It has been substantiated that chilling makes treatment by use of antivenin much more difficult by preventing antivenin in the blood stream from freely entering the bite area. There's general agreement that icing, or cryotherapy, has no place in the treatment of snakebite. The immediate bite area can be cooled to help relieve pain, but general chilling of a leg or arm should be done only if amputation is anticipated.

If the mechanical methods of treatment have pitfalls, then what is recommended? Informed doctors agree that the most beneficial first aid which can be given a snake bite victim is to keep him as quiet as possible, and immobilize the bitten area. He should not be allowed to swallow alcoholic stimulants as this will speed up circulation and help distribute poison through the body. The patient should be taken to a hospital as soon as possible. Clinically, the most effective treatment is antivenin administered directly into a vein.

There will be cases, of course, where medical help is hours away, or where the symptoms of poisoning are so severe and evolve so rapidly as to be of great urgency. I would strongly suggest that persons invest in a Wyeth antivenin kit if they intend to be in situations where several hours may be required to reach medical attention. Don't confuse this kit with the many types of "suction" kits which are on the market. There is presently only one company which manufactures snake antivenin in the United States and this is Wyeth. The antivenin is available through drugstores by prescription at about $12 per kit.

If one is hours from medical attention, the first aid of keeping as quiet as possible and immobilizing the bitten area still applies. The antivenin should be used as soon as possible. Directions on how to use the antivenin are included in the kit and it may even be administered by the victim if necessary. The kit contains vials of powder, a hypodermic syring and water for mixing the serum. The kit doesn't require refrigeration, so it can be carried conveniently in the field. Dosages are somewhat experimental even in hospitals, but it must be remembered that the smaller the body, the larger the dosage required. Ideally, the first dosage should be strong enough so as to overwhelm the poisons. Additional shots, however, will be required as swelling continues to advance and other symptoms of poisoning reoccur or become more severe.

Snake antivenin is not, however, taken without some calculated risk. Base of the antivenin is horse serum which causes a severe allergic reaction in some persons. Included in the kit is a test sample of serum for determining whether or not persons are allergic to horse serum before antivenin is administered. A small amount of the test serum is injected into the skin. A reaction in allergic persons will occur within five to 30 minutes and will be shown by welting or a more severe skin reaction at the site of the skin test. In general, the shorter the interval between injection and the beginning of the skin reaction, the greater the sensitivity. If there is a strong positive reaction, the administering of antivenin may be dangerous! Then, conditions and severity of the snakebite symptoms must be weighed against the hazards of reaction to the serum. A negative skin test is **not** 100% conclusive evidence that a serious immediate reaction might not occur. It also does not indicate whether a delayed reaction (serum sickness) will occur later.

In spite of the hazards, antivenin is presently the best single remedy for snakebite.

FIRST AID FOR ENVENOMATION

If medical aid is available within 4 hours:

1. Place the victim at rest.
2. Completely immobilize the part of the body that has been bitten.
3. Transport immediately to medical help.

If medical aid is more than 4 hours away or the envenomation appears to be catastrophic

1. Place the victim at rest.
2. Completely immobilize the part of the body that has been bitten.
3. Apply a lymph constricting band (preferably a flat, non-rigid band like a belt) just tightly enough to allow insertion of a finger without force beneath the band.
4. Make a linear incision, **no deeper than the skin** from ¼ to ½ inch long through each fang puncture (don't make X cuts).
5. Apply immediate suction to the wound area.
6. Transport to medical help.

Pitfalls

- Don't prolong suction—lymph constriction and suction are of little value more than thirty minutes after the bite occurs.
- Don't booze—alcoholic beverages cause poisons to spread more rapidly.
- Don't exert—exertion aids spread of venom.
- Don't put on a tight tourniquet unless envenomation appears to be catastrophic—this may cause gangrene.
- Don't chill with ice—chilling will cause destruction of tissue and may lead to amputation.

Mule deer on the Wall Creek game winter range. Damaged ranges may recover very slowly, even under ideal conditions. If game use prohibits establishments of new browse species, the ranges can not recover.

Deer in the Gravelly-Snowcrest Mountains

By Howard Chrest

The Gravelly-Snowcrest Mountains are located in southwestern Montana between Dillon and Ennis. In addition to big game hunting, this area offers some excellent fishing and fine bird hunting.

Many of the old timers who hunted this area reminisce of "good old days" when things were really not so good. Elk were scarce and to see a buck deer track was the talk of local get-togethers. While many people today might track a big buck for a couple of hours, or until it looks like he's "heading up," old-timers state that they stayed on a deer track all day and were often unsuccessful in their pursuit. They claim that we have plenty of game today, but not as much as during the late 40's and early 50's.

Fortunately for most deer winter ranges, we don't have the deer we had in the late 40's and early 50's. At that time, there were far too many deer for the ranges upon which the deer were dependent. The problem was one of too many deer for long periods of time. As a result, plants began to die because they couldn't tolerate the abuse they received from too much deer browsing. It is important to realize that summer areas which are occupied by deer are not as critical for deer survival as are deer winter areas. In the summer, food is abundant and deer are distributed over large areas. During the winter, however, deer are confined to small areas because of the deep snow in the higher areas.

The Gravelly-Snowcrest range is one of those areas where there are still too many deer, even though they are down considerably from their former numbers. After a close look at some of these areas, one can see numerous dead and dying deer browse plants. The upper Ruby drainage in the Timber Creek-Powder Gulch area supports large concentrations of deer during the winter.

By comparing information gathered at permanent study plots in this area over a ten-year period, an evaluation can be made as to what is taking place on the deer winter ranges. Preferred browse plants have deteriorated and deer are forced to feed on less desirable plants. Periodic measurements of browse plants taken on the winter range since 1958 to the present show range conditions disheartening and on the decline. The following tables illustrate briefly the changes which have already occurred. They show, for example, how the less desirable plants such as rabbitbrush and sagebrush become more heavily used as desirable plants like Mt. Mahogany die off.

The tables disclose how the per cent of leader use and of decadent plants are near their maximum. Now the greatest change is in the increased amount of dead plant crown. Plants which die after extended periods of excessive browsing are not being replaced because young plants are clipped by hungry deer before they can become established. In the spring of 1950, mountain mahogany plants were checked in the Timber Creek area. At that time, 8% of the plants had died. Eight years later, 72% of the plants were dead.

The unfortunate part of the deer management program is that the problem of too many deer was recognized during the late 1940's. Deer were dying of malnutrition and deer damage complaints were common. Hunting seasons were gradually liberalized, but it was not until 1956 that general two-deer, either-sex

Timber Creek (Sagebrush)	**1958-1962**	**1963-1967**
Leader Use	58%	80%
Decadent Plants	30%	59%
Dead Crown	12%	29%
Timber Creek (Mountain Mahogany)	**1959-1961**	**1962-1966**
Leader Use	83%	85%
Decadent Plants	100%	99%
Dead Crown	78%	87%
Timber Creek (Rabbitbrush)	**Prior-1964**	**1964-1967**
Leader Use	No data	84%
Decadent Plants		61%
Dead Crown		37%
Powder Gulch (Rabbitbrush)	**Prior-1966**	**1966-1967**
Leader Use	No data	63%
Decadent Plants		80%
Dead Crown		55%
Powder Gulch (Sagebrush)	**1962-1965**	**1966-1967**
Leader Use	73%	90%
Decadent Plants	50%	56%
Dead Crown		29%

Leader use is amount of stems of browse plants which are eaten by deer.

Decadent plants are those in which more than 25% of the overall plant is dead.

Dead Crown is the amount of a plant which is dead.

hunting was permitted. This was a step in the right direction, compared to the buck-only season prior to 1950, but it did not provide for the reduction of deer necessary to allow winter range recovery. Late seasons have been tried, and still the deer population is above the level which the range can support.

What can be done to properly manage deer in the Gravelly-Snowcrests? Liberal seasons and sufficient harvests which will get and **keep** the deer population below the level which the range will adequately support. A program of this nature will require more hunters and the hunting will become more difficult. When the winter ranges recover, then the deer population again could be allowed to increase.

Don't Junk It– Fishing Survey

Mail boxes today are so often cluttered with what has been termed "junk mail," it's little wonder that most anything with the look of mass production about it is likely to wind up in the trash can. Scattered prolifically among the junk items are waves of questionnaires, many of which are simply gimmicks leading up to a sales pitch, or a foot in the door item to be followed up by a "personal interview." Among the surveys, though, there's occasionally an item which is dead serious and important in its own way. Surveys from the Fish and Game Deppartment, we feel, fall into this latter category.

Unfortunately, people often do not understand what the Fish and Game Department is trying to accomplish with its mail questionnaires, or how answering the questionnaires may help improve their sport of hunting or fishing. Take the present mail fishing survey, for example. An occasional form will be returned with the caustic comment that "If you would use your money to plant more fish rather than wasting it on this goofy survey, fishing **would** improve!"

Fish and game, like other businesses, must have an idea of which services, or parts of services are being most used. In the case of fishing it needs to know how many fishing days are spent on large rivers

STATE OF MONTANA — SPORT FISHING SURVEY

We need help in gathering fishing information on Montana's lakes and streams. You are one of a small group of representative fishermen we are contacting. Please let us know where you went fishing **during the past two weeks.**

This is not a survey to determine how many or what kind of fish you caught. So, **even if you did not fish, did not catch any fish,** or released the ones you caught, please fill out and return the attached card.

Thank you

Sincerely,

Frank H. Dunkle

FRANK H. DUNKLE, DIRECTOR
MONTANA FISH AND GAME DEPARTMENT

Did you fish on any of the days listed below? Yes ☐ No ☐

If yes, for each day fished please list the places you fished and the nearest town.

DAY 1968	NAME OF LAKE OR STREAM FISHED	NEAREST TOWN OR COUNTY	Do not Write
Wed. July 10			
Thur. July 11			
Fri. July 12			
Sat. July 13			
Sun. July 14			
Mon. July 15			
Tues. July 16			
Wed. July 17			
Thur. July 18			
Fri. July 19			
Sat. July 20			
Sun. July 21			
Mon. July 22			
Tues. July 23			

The double postcard questionnaire isn't designed to show how many fish are being caught. It's designed to show which fishing waters are being utilized.

as compared to large reservoirs—or how fishing pressure on mountain lakes compares to that on farm pounds. In fact, an estimate of fishing pressure on each important individual water is needed. How else can a fishery manager determine whether such measures as stream improvement, lake rehabilitation, purchase of fishermen access areas, or fish stocking are effective, or are even justified?

Such information can be obtained from field creel census, but this gets very costly. It involves having census takers to patrol stream or lake shores, or where practical to set up checking stations. Ideally, every fisherman should be contacted when he completes his fishing for the day. Obviously, this is impossible so there must be some sort of sampling plan. No matter what system is devised, field creel census is costly and the census of a single stream can easily cost $10,000 to $15,000 each year. It has been found that a much less expensive yet still reliable sampling method can be accomplished by mail questionnaires.

The questionnaire pictured here is being mailed to a number of persons who have purchased fishing licenses. You'll notice that it doesn't ask what kind or how many fish were caught. These questions were omitted firstly to remove the burden of such questions, and secondly because the information that is being sought is—how many fishermen fished during a certain month, and where was the fishing pressure. It is comparatively easy to determine what the average fisherman catches, and this information can be readily determined for specific waters through field checks by fish and game personnel.

Although the questionnaire you are asked to answer is fairly simple, the sampling plan is complex. When we receive your completed questionnaire, the waters in which you fished are given their individual code numbers and all the information you gave us is fed into an electronic computer. The computer is programmed to combine information from all questionnaires received for the year with information on the number of fishing licenses sold. The end product is the estimated number of fishing days spent in the state and the number spent on individual waters with appreciable fishing pressure. This is an invaluable tool for the fisheries managers. The survey is supported with Federal Aid in Fish Restoration funds.

If you receive a questionnaire, please fill it out and return it. We have tried to design questionnaires to be as easy as possible for you. Then too, they are only sent to a small sample of the fishing license holders so you shouldn't get one too often. At the same time, information from you is important since you in effect, represent many fishermen. Please answer your questionnaire even if you did not fish during the period covered or did not catch anything.

This all boils down to the fact that information gained from fishing questionnaires does help fishing. It enables the Fish and Game Department to evaluate its program and determine how and where it can provide the best fishing for the sportsmen's dollars.

MONTANA
FISH AND GAME DEPARTMENT

HELENA, MONTANA 59601

Return Postage Guaranteed

3

MONTANA OUTDOORS

Published monthly by the Montana Fish and Game Dept., Mitchell Building, 125 Roberts St., Helena, Montana 59601

Second class postage rates paid at Helena, Montana 59601

JUNE, 1968